Lower Western Shore

SAV Distribution

The well-defined linkage between water quality and submerged aquatic vegetation (SAV) distribution and abundance make SAV communities good barometers of the health of estuarine ecosystems (Dennison *et al.*, 1993). SAV is important not only as an indicator of water quality, but it is also a critical nursery habitat for many estuarine species. Blue crab post-larvae are 30 times more abundant in SAV beds than adjacent unvegetated areas (Orth, 1992). Similarly, several species of waterfowl are dependant on SAV as food when they over-winter in the Chesapeake region (Perry and Deller, 1995).

SAV distribution is determined through the compilation of aerial photography directed by the Virginia Institute of Marine Science. Reports detailing methodology and annual SAV coverage are available at www.vims.edu/bio/sav. Details on species of SAV discussed in this report can be found at www.dnr.maryland.gov/bay/sav/key.

Habitat Status

The Chesapeake Bay Program has developed new criteria for determining SAV habitat suitability of an area based on water quality. The "Percent Light at Leaf" habitat requirement assesses the amount of available light reaching the leaf surface of SAV after being attenuated in the water column and by epiphytic growth on the leaves themselves (Kemp *et al.,* 2004). The document describing this new model is found on the Chesapeake Bay Program website (www.chesapeakebay.net/pubs/sav/index.html). The older "Habitat Requirements" of five water quality parameters are still used for diagnostic purposes (Dennison *et al.*, 1993).

Magothy River

The Magothy River has shown an increasing trend in SAV coverage from 1993 to 1998, reaching 300 acres in 2004, or attaining 55% of the revised goal of 545 acres (**figure 1**). Extensive ground-truthing by the U. S. Fish and Wildlife Service has found 13 different species throughout the river, with horned pondweed, widgeon grass and milfoil the most common species found. Water quality data from the monitoring station located between North and South Ferry Points indicate that the SAV habitat requirements pass for suspended solids, phosphorous and nitrogen concentration, light attenuation and percent light at leaf are borderline, while algae levels fail (**figure 2**).

Severn River

This river has shown an increasing trend in SAV coverage (**figure 1**), beginning in 1994 through 1999. The 1999 SAV coverage is the largest amount of SAV that has ever

been recorded (455 acres) exceeding the revised goal of 330 acres by 38%. However, the 2000 acreage was down substantially, to128 acres, most likely due to massive algae blooms. Anecdotal accounts indicate that SAV recovered in 2001. However, VIMS was unable to get complete coverage, again due to flight restrictions. The recovery continued in 2002 and there was a small decline in 2003, and SAV increased to 388 acres in 2004. The beds are typically located downstream of Cedar Point, and upstream of Weems Creek, with the most SAV found in Round Bay. Ground-truthing by citizens and the U. S. Fish and Wildlife Service has found 5 species in Severn River, in order of occurrence: horned pondweed, widgeon grass, redhead grass, milfoil and sago pondweed. Data from the water quality monitoring site located near the U. S. Route 50 bridge indicate that SAV habitat requirements are met for suspended solids and phosphorous concentrations. Light attenuation, nitrogen levels and percent light at leaf are borderline, while concentration of algae failed the habitat requirement (**figure 2**).

South River

The South River showed an increasing trend in SAV coverage, beginning in 1994 and ending in 1998, where SAV coverage was 54 acres, or 12% of the 459 acre revised goal (**figure 1**). No SAV was reported in 2000, again most likely due to algae blooms. In 2002 there were 36 acres and in 2003 there were 14 acres. In 2004, SAV coverage increased dramatically, to 46 acres, or about 10% of the goal. Most SAV beds have been located between Mayo and Larrimore Points, primarily on the southern shore. There has been extensive ground-truthing of this area by citizens, and they have identified 6 species, listed here in order of occurrence: horned pondweed, widgeon grass, slender pondweed, curly pondweed, wild celery and 1 unidentified species. Data from the water quality-monitoring site located near Shadow Point indicate that the SAV habitat requirements are met for suspended solids, nitrogen and phosphorous concentrations and borderline for percent light at leaf, while light attenuation and algae concentrations fail (**figure 2**).

Rhode River

SAV has not been reported in the Rhode River since 1978 by the aerial survey, and this coverage represents the Tier I goal of 15 acres (**figure 1**). Citizen ground-truthing has found four species of SAV, horned pondweed, widgeon grass, milfoil and an un-identified species, scattered throughout the river. Data from the water quality-monitoring site located near High Island indicate that the SAV habitat requirements are met for suspended solids, nitrogen and phosphorous levels, and the river fails for light attenuation, percent light at leaf and algae levels (**figure 2**).

West River

The West River has had very little SAV mapped since 1984. There were approximately 10 acres in 1994 and 1998 and 23 acres in 2003, well below the revised goal of 214 acres (**figure 1**). The beds mapped in 2003 were located in Parrish Creek. No SAV was identified in 2004. There has only been one spot ground-truthed in this river, in

Johns Creek by a citizen in 1995, who found only widgeon grass. Data from the water quality-monitoring site located near Councillors Point indicate that the SAV habitat requirements for suspended solids, concentrations of nitrogen and phosphorous are met, and the river fails for light attenuation, percent light at leaf and algae concentration (**figure 2**).

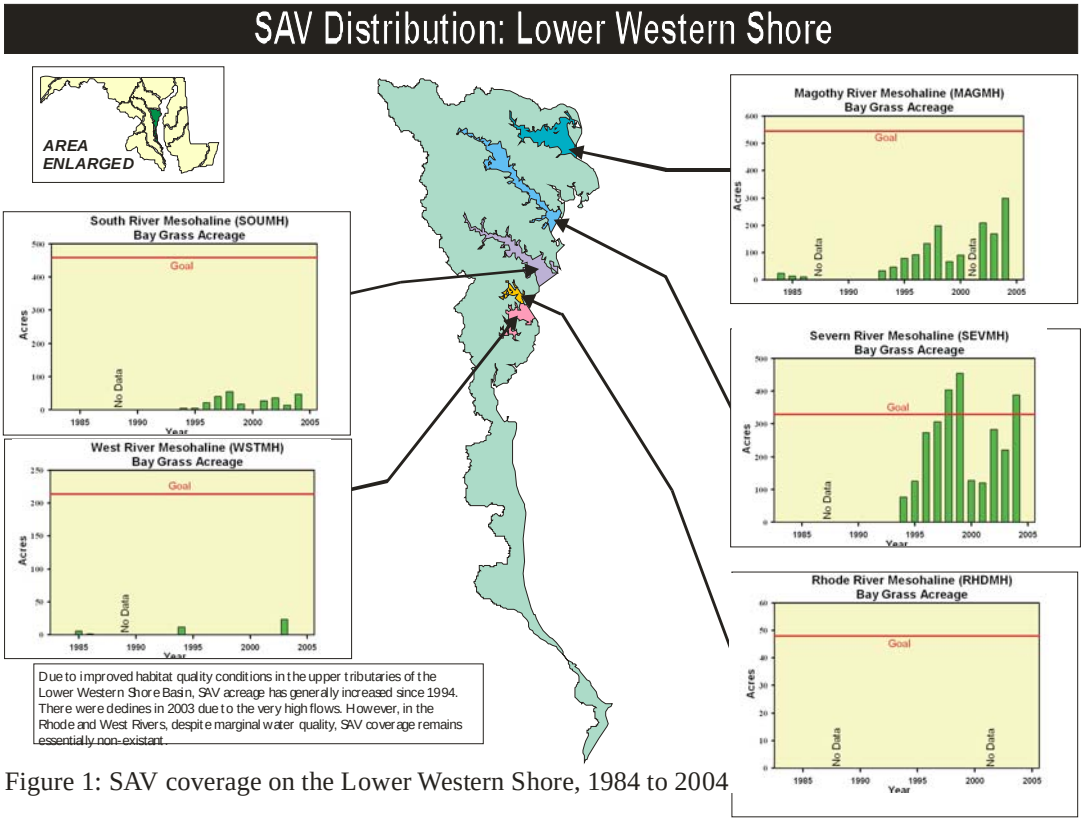

Figure 1: SAV coverage on the Lower Western Shore, 1984 to 2004

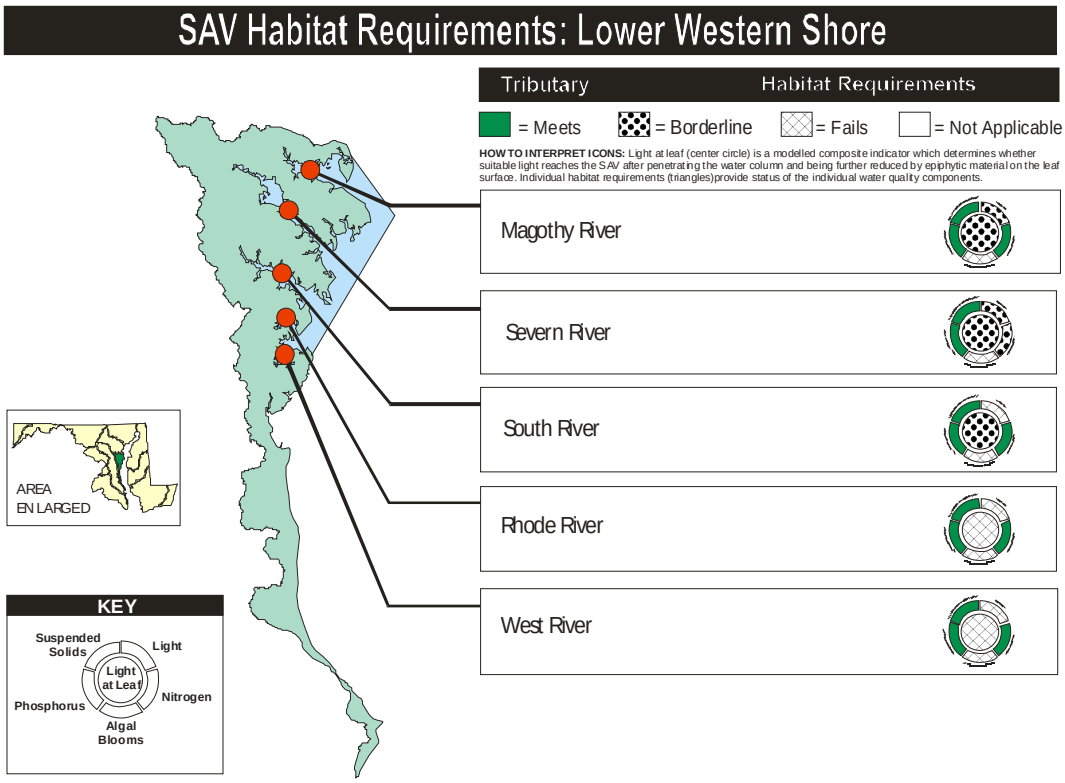

Figure 2: SAV habitat requirement attainment on the Lower Western Shore

References

Assessing water quality with submersed aquatic vegetation. W. C. Dennison, R. J. Orth, K. A. Moore, J. C. Stevenson, V. Carter, S. Kollar, P. Bergstrom and R. A. Batiuk. Bioscience. 1993. 43:86-94.

A perspective on plant-animal interactions in seagrasses: physical and biological determinants influencing plant and animal abundance. R. J. Orth. *In:* D. M. John, S. J. Hawkins, and J. H. Price (eds.). Plant-Animal Interactions in the Marine Benthos. Systematics Special Volume No. 46, Clarendon Press, Oxford, 570 pp. 1992. p. 147-164.

Waterfowl population trends in the Chesapeake Bay area. M. C. Perry and A. S. Deller. *In:* P. Hill and S. Nelson (eds.). Toward a Sustainable Coastal Watershed: The Chesapeake Experiment. Proceedings of a Conference. Chesapeake Research Consortium Publication No. 149, Chesapeake Research Consortium, Inc. Edgewater, Maryland. 1995. p. 490-500.

Habitat Requirements for Submerged Aquatic Vegetation in Chesapeake Bay: Water Quality, Light Regime, and Physical-Chemical Factors. W. M. Kemp, R. Batiuk, R. Bartleson, P. Bergstrom, V. Carter, C. L. Gallegos, W. Hunley, L. Karrh, E. W. Koch, J. M. Landwehr, K. A. Moore, L. Murray, M. Naylor, N. B. Rybicki, J. C. Stevenson and D. J. Wilcox. Estuaries. 2004. 27:363–377.